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# ENERGY CONSERVATION IN NAVY FAMILY HOUSING: A "MASTER-METERED" APPROACH




NAVY PERSONNEL RESEARCH
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# ENERGY CONSERVATION IN NAVY FAMILY HOUSING: A "MASTER-METERED" APPROACH

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The purpose of the study was to develop, implement, and evaluate an intensive behavioral approach for inducing energy conservation in master-metered Navy family housing. A 200-unit housing complex was divided into equal-sized groups and treatment was randomly assigned to one group. Participants received energy-related materials and feedback regarding group energy consumption. An energy coordinator made household visits to participating residences. The participating group significantly reduced their

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electricity consumption to a level 4 percent below that of the control group. Energy-related attitudes, as measured by a questionnaire, were not found to be significant predictors of consumption. Consumption feedback and personal contact are seen as important supplements to traditional educational approaches to inducing behavioral change.

## FOREWORD

This research is part of a continuing energy conservation program sponsored by the Naval Facilities Engineering Command. The objective of the program is to provide Navy management with strategies for use in formulating energy conservation policies to encourage conservation by residents of Navy family housing units.

This report is the second in a series concerning this program. The initial report (NPRDC SR 79-23) examined the conservation-related attitudes and practices of Navy family housing residents. The current effort evaluates a conservation program for master-metered housing sites. Results will be applied by Navy family housing offices in developing and administering energy conservation programs among family housing residents.

Appreciation is expressed to the staff at the housing office at the Naval Air Station, Pensacola, Florida and to the many people who have assisted with this effort, particularly Janice McNair, who served as the energy conservation coordinator.

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## SUMMARY

### Problem

In 1977 Congress mandated the metering of utilities in DoD family housing as an initial step toward reducing energy consumption. This action expressed the high priority of energy conservation. However, the method for achieving conservation, with its associated costs and assumptions, raised issues regarding alternatives for attaining this end.

### Purpose

The purpose of the effort described herein was to develop, implement, and evaluate an intensive behavioral approach for inducing energy conservation in master-metered Navy family housing units.

### Method

The treatment program was designed on the principle of high intensity intervention during periods of high utility consumption (i.e., heating and cooling seasons) at housing sites equipped with master meters.

A 200-unit Navy family housing complex was divided into two equal-sized groups and treatment was randomly assigned to one group. Treatment group residents were exposed to a complex behavioral strategy designed to enhance energy conservation, including biweekly feedback regarding group energy consumption, energy-related educational activities and materials, and an energy coordinator who made household visits to treatment residences to clarify conservation information and to emphasize the importance of active participation in the conservation program.

The study was conducted over a 14-week period with the initial 2 weeks as the pretreatment baseline period, the next 8 weeks as the treatment period, and the final 4 weeks as posttreatment follow-up period. Prior to initiating the treatment, a questionnaire was distributed to all residences to determine demographics, appliances, and energy-related attitudes of the treatment and control group residents.

### Results and Discussion

1. The treatment group significantly reduced their electricity consumption relative to that of the control group. Treatment group consumption reached a level 4 percent below that of the control group by the fourth week of treatment. This difference was maintained throughout the rest of the treatment and during a 4-week follow-up period.

2. Six factors were extracted from the questionnaire items on energy-related attitudes. However, these factors were not found to be significant predictors of baseline electricity consumption.

3. Interviews revealed that the energy conservation coordinator was perceived as the key component of the treatment, personalizing the information, tips, appeals, and consumption feedback to the residents. The coordinator was seen as having a positive influence on residents' motivation, which was supported by positive consumption feedback.

4. Energy-related activities generally failed to draw wide resident participation. However, one activity for children of elementary school age had substantial impact by encouraging joint participation of children and their parents.

## Conclusions

An effective behaviorally-oriented energy conservation program for master-metered military family housing appears to be a potentially viable alternative to other approaches. Effectiveness depends on personal contact and consumption feedback supplementing educational approaches. With program extension and refinement, greater energy savings than those demonstrated here should be attainable with less required effort.

## Recommendations

1. The conservation program should be developed further and extended to cover the entire annual cycle.

2. An energy conservation manual should be prepared to assist in the implementation and operation of the conservation program.

3. The fully developed conservation program should be implemented under differing climatic conditions to evaluate the program's cost effectiveness.

## CONTENTS

# INTRODUCTION

## Problem

During the 1977 Congressional session, the House and Senate Armed Services subcommittees mandated a pilot program to test the feasibility of (1) converting DoD family housing from master to individual metering of utilities, (2) developing a norm formula for calculating a reasonable and fair utility allowance for tenants, and (3) developing a system for billing and collecting charges for "excess" usage. The ultimate purpose of the plan was to achieve energy conservation in military family housing by extending the pilot program to all DoD family housing.

From an economic perspective, Congress apparently assumed that the demand for utilities by family housing tenants is elastic and that making the tenants financially accountable for the energy they consume would result in decreased demand. From a behavioral science perspective, the behavior change process raises several issues, including tenants' knowledge of appropriate practices, the effects of financial incentives, and the unexpected consequences of the plan. Even if Congress is willing to bear the extremely high cost of conversion to individual metering, a more fundamental question is whether or not individual metering is necessary to achieve its conservation goal.

## Background

The energy conservation research program was initiated at the Navy Personnel Research and Development Center (NAVPERSRANDCEN) in response to the issues implicit in the DoD pilot metering program. The primary thrust of the program has been to examine behavioral strategies for inducing energy conservation in family housing, with or without the individual metering of housing units.

An evaluation of behavioral approaches relying on individual consumption feedback and positive incentives together with intensive educational programs (Feher & Somer, 1979) was initiated in locations with individual metering. Strategies appropriate for master-metered settings would be of greater relevance because the majority of DoD family housing has master meters, which would require substantial time and money to convert to individual metering. An effective behavioral strategy for inducing utility conservation in master-metered settings would meet Congressional energy conservation goals more quickly and economically than would implementation of individual metering. The problem is whether or not an effective behavioral strategy exists for inducing energy conservation in master-metered Navy housing and, if so, to what extent the approach would be effective.

Studies have demonstrated the potential effectiveness of behavioral approaches in reducing utility consumption in master-metered settings. For example, Hayes and Cone (1977) used monetary payments, energy information, and daily consumption feedback in an attempt to reduce electricity consumption in a university student housing complex. While information alone did not significantly affect consumption, the use of both monetary incentives and consumption feedback resulted in significant reductions. Subsequent studies using financial incentives have had similar success at master-metered sites (McClelland & Cook, 1980; Walker, 1979). The use of feedback and incentives also has been successful under individually-metered conditions (e.g., Seligman & Darley, 1977; Winett, Kagel, Battalio, & Winkler, 1978).

The energy-related attitudes and practices reported for Navy family housing residents have been assessed (White, Magnusson, & Somer, 1979; Little, McCabe, Mills,

Feher, & Somer, in press). Although the typical attitudes and practices reported by the residents were consistent with conservation practices, the relationship between their verbal reports and actual consumption has yet to be examined. In a recent nonmilitary study (Seligman, Kriss, Darley, Fazio, Becker, & Pryor, 1979), a direct relationship was found between the energy-related attitudes of homeowners and their actual electricity consumption. Comfort and health were among the attitude factors that served as significant consumption predictors. Several researchers (e.g., Darley, Seligman, & Becker, 1979; Stern & Kirkpatrick, 1977) have emphasized the importance of residents' energy-related attitudes in the development of long-term reductions in consumption.

Although numerous studies have demonstrated effective behavioral approaches for reducing energy consumption, the use of monetary incentives and daily feedback is often impractical, particularly under master-metered conditions. Consequently, an alternative means of reducing consumption must be developed.

### Purpose

The purpose of the effort described herein was to develop, implement, and evaluate an intensive behavioral approach for inducing energy conservation in master-metered Navy family housing units.

## METHOD

### Design

The energy conservation program was conducted as though the site were master metered, although individual meters made it possible to track household electricity consumption. The program ran for a period of 14 weeks with the initial 2 weeks as the pretreatment baseline period, the next 8 weeks as the treatment period, and the final 4 weeks as the posttreatment follow-up period.

### Subjects

Subjects consisted of service members and their families living at the Corry Station housing complex of the Pensacola Naval Air Station in northwestern Florida. This complex consists of 200 duplex housing units, each with three bedrooms and one and one-half baths. Units are individually metered for electricity, but all are on a common (master) meter for natural gas. Furnished electrical appliances include the garbage disposal, dishwasher, refrigerator, exhaust fans, and air conditioner. The range, space heater, and water heater use natural gas. The weather during the period of the study from July through October 1979 was usually humid, with average daily temperatures gradually declining from 82 degrees in July to 69 degrees in October.

All service members at the Corry Station housing complex are enlisted personnel (E-4 through E-9). At the time of the study, over 90 percent of the families had either two or three children. More than 90 percent of the service members had completed high school and half had completed at least some college. Over 80 percent were between 26 and 40 years of age. Half had lived in their residence 1 year or less, and over 80 percent had lived in their unit 2 years or less.

Subjects in half of the housing units were assigned to a treatment group; and those in the other half, to a control group. This was done by drawing a line through the plot plan

of the housing development. To reduce treatment contamination, the line was drawn to minimize the assignment of adjacent units to different groups.

## Materials

The primary materials used in the program included a pretreatment questionnaire, a series of newsletters, and various educational materials.

1. A survey questionnaire was distributed to each residence in both the treatment and control groups. The questionnaire consisted of 47 items designed to assess residents' demographic background (#1-15), personally-owned appliances (#16-24), and attitudes regarding several energy-related topics (#25-47). Responses to the attitude items were to be made on a six-point scale, where 1 = strongly agree, 2 = agree, 3 = neither agree nor disagree, 4 = disagree, 5 = strongly disagree, and 6 = no opinion. A copy of the questionnaire is provided in Appendix A.

2. A newsletter, entitled "The Corry Kil-A-Watt," was distributed every 2 weeks to each residence in the treatment group. An example is presented in Appendix B. Weekly electrical consumption and goals for the two groups were reported in the newsletter as bar graphs with explanatory text. Each newsletter also presented conservation tips (e.g., regarding use of air conditioning) and announcements of events planned for treatment group members (e.g., speakers, contests).

3. Over the course of the study, treatment families received a variety of energy-related educational literature. These materials included a comic book with Disney characters, a conservation cookbook, several pamphlets about electricity, a poster, and stickers.

## Coordinator

A full-time on-site energy conservation coordinator was hired to be responsible for the local operation of the program and to assist in the research. The coordinator (1) distributed various program materials, including the questionnaire, newsletters, and reminders of upcoming events, (2) planned and organized several energy-related activities, (3) visited the treatment group residences, and (4) read electric meters for each of the 200 residences weekly.

## Procedure

The study was initiated by the distribution of the questionnaire to all 200 of the residences in the Corry Station housing project. The questionnaire included a letter from the housing director urging residents to complete the survey. The majority of questionnaires were collected by the coordinator during the following 2 weeks. The questionnaires were the only direct involvement of the control group in the program. Four days after distribution of the questionnaires, the first newsletter was delivered to treatment residents. Subsequent newsletters were distributed every 2 weeks for the remainder of the treatment period.

Throughout the study, the coordinator visited the homes of the families in the treatment group to personally communicate conservation information. A sample family contact format is provided in Appendix B. Interviews were directed at repeating and clarifying the conservation tips in the current period's newsletter. Additional rationale for recommended practices was provided where available. Conservation achievements of the treatment group were commended and further efforts toward the goal were

encouraged. During each visit, families were given materials relevant to the topic of the period. Although plans were to have the coordinator visit each treatment family once every 2 weeks, this proved impossible in practice, since some families were very difficult to find at home. This resulted in a varying number of visits. Of the 83 families present throughout the entire study, 31 were visited three times, 39 were visited twice, 12 were visited once, and 1 was never visited.

A concerted effort was made to involve all members of the treatment families in the conservation program. Activities planned for children included a speaker/demonstration series with personnel from the local utility company, an "energy detective" program designed to raise awareness of the relationship of individual consumption practices to energy consumption levels, and a poster contest with public exhibition of entries. Older children (12 and above) were offered an opportunity to tour a power plant. Finally, a speaker series was offered for adults, drawing on extension personnel from the local utility company.

On completion of the treatment, 21 participants were interviewed for their reactions to the program and for suggestions for its extension and improvement. An effort was made to interview a cross section of conservers and nonconservers.

Analyses

1. As indicated previously, the energy conservation coordinator gathered weekly electricity consumption data on each of the 200 residences in the housing complex. However, since 34 families moved out of the housing complex during the period of the study, complete consumption data were available for only 166 families, equally divided among treatment and control groups. Using the Biomedical Computer Programs P-Series (Dixon & Brown, 1979), a 2 x 10 repeated measures analysis of variance (ANOVA) was performed to compare the consumption rates of the two groups over the first 10 weeks of the study.

2. Chi-square analyses were performed to determine any differences in the responses of treatment and control groups to the demographic and appliance questionnaire items (#1-24).

3. The Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975) was used to factor analyze the 23 attitude items included in the questionnaire. A principal factoring procedure was used. This procedure uses an iterative approach and was selected because of its reputation for extracting clear factor solutions. Only those subjects whose responses were at least 85 percent usable were included in this analysis (N = 139); all others were eliminated (no opinion responses were scored as missing values).

4. From the final factor solution obtained for the attitude items, composite factor scores were calculated for each respondent on each emerging factor. A regression analysis was then performed using the SPSS (Nie et al., 1975) stepwise multiple regression program. The attitude factors served as the predictors of energy consumption, and the amount of electricity consumed during the initial 2 weeks of the study served as the criterion.

## RESULTS

### Electricity Consumption

The study extended from July 25 to October 31. In general, the average daily temperature decreased over this period and the temperature variability increased. Since electricity consumption is quite sensitive to the use of air conditioning, the downward trend in temperature should result in a decrease in energy consumption.

Results of the ANOVA performed to compare the consumption rates of the the treatment and control groups over the first 10 weeks of the study yielded a significant treatment-by-time interaction ($F(9,1476) = 2.95$, $p = .002$). Figure 1, which presents the mean weekly consumption levels of the two groups across the 14 weeks of the study, shows that there was a systematic decrease in the consumption of the treatment group relative to the consumption of the control group during the conservation program.

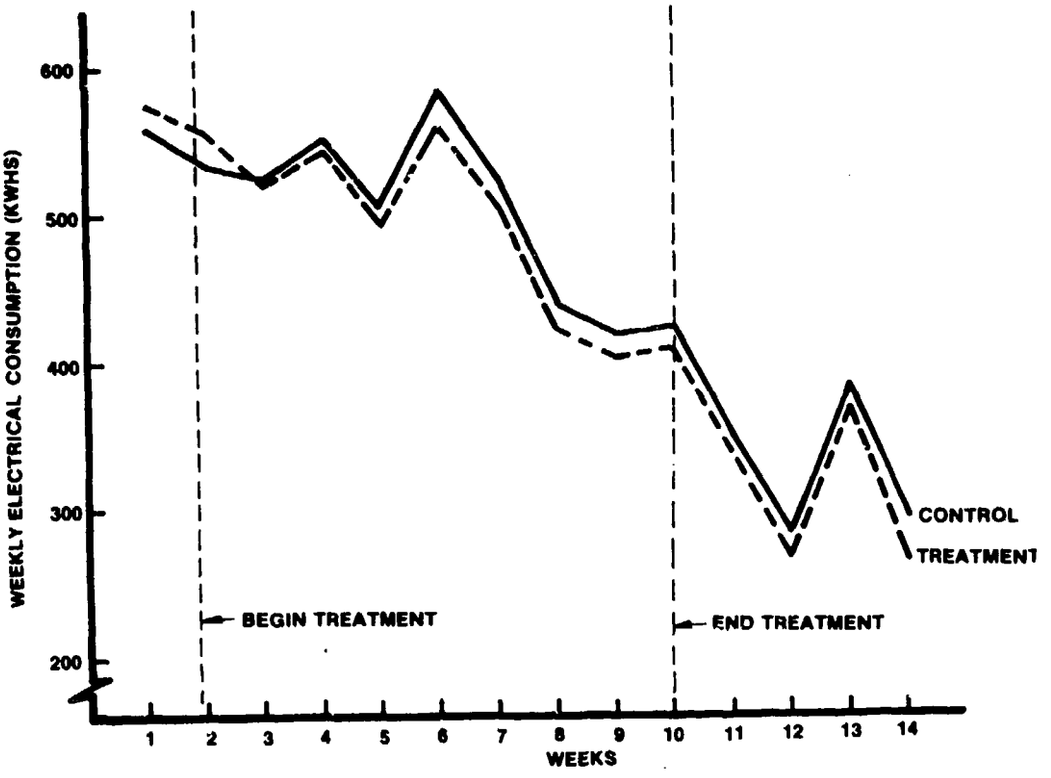


Figure 1. Average weekly electricity consumption of Corry Station residents.

Figure 2 presents the percentage difference in consumption for the treatment and control groups. As shown, treatment group residents consumed more energy during the initial baseline weeks. However, after the treatment began, they gradually reduced their consumption to a relatively stable level approximately 4 percent below that of the control group. This difference was maintained for the rest of the treatment period and during the 4-week follow-up period.

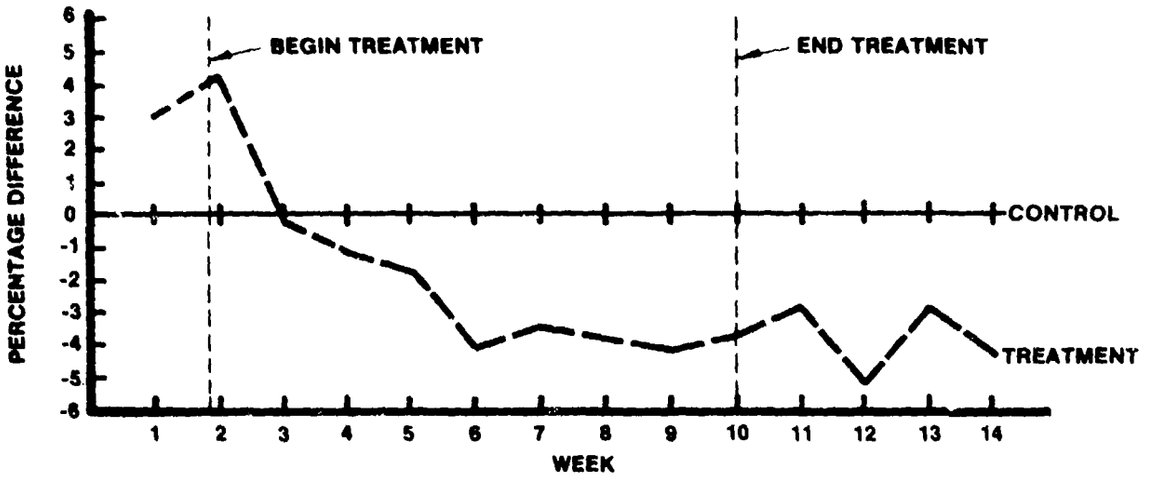


Figure 2. Percentage difference in electricity consumption of the treatment group relative to the control group.

## Questionnaire Data

A total of 161 questionnaires were completed, for a return rate of 80.5 percent. Ninety-one of these questionnaires came from the treatment group; and 70, from the control group. Responses are described in the following paragraphs.

### Demographics/Appliances

The chi-square analyses performed on responses of the two groups to the demographic and appliance items (#1-24) showed no significant differences ($p > .05$). Thus, the two groups were relatively equal with respect to the demographic and appliance variables measured. All families in both groups reported owning at least one television set, with nearly half owning two or more. The next most frequently owned appliances were clothes washers (97%), clothes dryers (86%), freezers (46%), second refrigerators (25%), microwave ovens (13%), electric fans (7%), and heated waterbeds (1%).

### Energy-related Attitudes

The initial solution of the factor analysis performed on the 23 attitude items extracted eight factors with eigenvalues of 1.0 or greater, accounting for 64.3 percent of the total variance. Factor solutions extracting from five to eight factors were then examined, and varimax rotations were performed to simplify the within-factor loadings. The six-factor solution was selected as most clearly interpretable. This solution resulted in five of the six factors having latent roots greater than 1.0, with a range from 1.97 to .89. These six factors accounted for 41.5 percent of the total variance.

Table 1 presents the six factors, with their component items listed according to decreasing magnitude of loading. Items with loadings of .30 or greater on the rotated factor matrix were included in the interpretation. This resulted in complexities of 1 for

16 of the items. Of the remaining seven items, four loaded on two of the factors, and three failed to load on any factor. The factors are described below:

1. Conservation Image. Factor I consisted of three items that measured respondents' views of themselves and their families with respect to energy conservation.

2. Personal Impact. Factor II consisted of six items that evaluated respondents' beliefs regarding the impact of personal practices on the overall energy situation.

3. Willingness to Pay for Utilities. The five items in Factor III evaluated the willingness of respondents to pay for their utility consumption. This factor was rather specific in that it amounted to asking respondents if they preferred paying for utilities or reducing their consumption.

4. Importance of Air Conditioning. Factor IV concerned respondents' attitudes toward the importance of air conditioning. Three of the four items that loaded on this factor emphasized the necessity of air conditioning.

5. Reality of Energy Shortage. Factor V consisted of three items that examined respondents' views concerning the nature of the present energy situation.

6. Coercion. Factor VI consisted of three items that were related to respondents' attitudes toward the use of coercion in promoting conservation. Since this factor has a minimal latent root (.89) and relatively low factor loadings, its stability and usefulness are probably limited.

Table 2 provides a percentage breakdown of responses to each of the attitude items for all subjects who completed the questionnaire (N = 161). The results show that residents tended to hold proconservation attitudes, although substantial exceptions are evident. With respect to Factor I, nine out of ten respondents see themselves and their families as energy conservers. Although approximately two-thirds of the responses to items loading on Factor II expressed the importance of personal conservation, there were notable exceptions. For example, over a third of the respondents did not believe that waste in the home has contributed greatly to the energy problem. On Factor III, over three-quarters of the respondents expressed a preference for reducing their utility consumption rather than paying for some of it. Still, more than 10 percent reported their willingness to pay for utilities. With respect to Factor IV, over three-quarters of the respondents expressed nonconservation views by emphasizing the importance of air conditioning. The responses to Factor V indicate that most respondents believe in the reality of the energy shortage--although nearly a third do not.

Results of the regression analysis performed using the attitude factors as predictors and the amount of electricity consumed during the initial 2 weeks of the study as the criterion accounted for only 3.52 percent of the total consumption variance. Thus, the analysis failed to reach statistical significance ($F(6,132) = .80$, $p > .05$).

## Interview Data

Of the total of 21 interviewees, 10 had exhibited minimal change in relative consumption between the first and the last 2 weeks of the treatment program, 6 had decreased their consumption during this period, 2 had increased their consumption, and 3 could not be categorized because they were not full-term residents.

Table 1

Summary of Factor Analysis of Attitude Items (N = 23)

| | Factor/Component Items | Factor Loading I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|---|
| I. | Conservation Image | | | | | | |
| | I consider myself to be an energy conserver. (36) | .84 | .07 | -.14 | -.07 | .04 | .02 |
| | I would conserve energy regardless of whether I had to pay for it or not. (41) | .70 | .05 | -.17 | .05 | -.11 | -.15 |
| | In my family we generally try to conserve energy. (31) | .56 | .26 | -.02 | .15 | .04 | -.02 |
| II. | Personal Impact | | | | | | |
| | Energy conservation in the home could ease present energy problems. (32) | .18 | .80 | -.02 | -.02 | -.11 | -.14 |
| | Wasteful consumption in the home has greatly contributed to this country's energy problems. (29) | .10 | .54 | -.23 | -.08 | -.03 | .05 |
| | There will continue to be enough energy for our homes if everyone quits wasting it. (38) | .25 | .46 | -.06 | -.02 | -.01 | .19 |
| | If people were better informed about the energy situation they would conserve more. (25) | -.03 | .42 | .00 | -.03 | -.05 | -.11 |
| | I would be willing to reduce my energy consumption if it cost me something not to. (37) | .04 | .36 | -.28 | -.07 | -.20 | .49 |
| | I would rather reduce my energy consumption than have to pay for it. (30) | .19 | .35 | -.46 | -.06 | -.14 | .04 |
| III. | Willingness to Pay for Utilities | | | | | | |
| | I would rather pay for part of my utilities than reduce my energy consumption. (26) | -.10 | -.01 | .87 | -.14 | -.16 | .09 |
| | I would rather reduce my energy consumption than have to pay for it. (30) | .19 | .35 | -.46 | -.06 | -.14 | .04 |
| | It is too much effort to shut off the air conditioning and open the windows every time it gets a little cooler outside. (46) | -.13 | -.08 | .37 | .14 | .11 | -.04 |
| | My own personal comfort is worth more to me than saving electricity. (42) | -.13 | -.09 | .36 | .39 | .21 | .07 |
| | People have the right to use as much electricity as they want. (44) | -.18 | -.14 | .31 | .12 | .23 | .33 |

Notes.

1. Numbers in parentheses are questionnaire item numbers.
2. Based on responses of 139 subjects.

Table 1 (Continued)

| Factor/Component Items | Factor Loading I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| IV. Importance of Air Conditioning | | | | | | |
| It is essential to my family's health and well-being for the house to be air conditioned in the summer. (45) | .21 | -.16 | -.05 | .75 | .10 | .02 |
| I find I can't relax or work well unless the house is air conditioned in the summer. (34) | .05 | -.06 | .09 | .68 | .06 | .12 |
| My own personal comfort is worth more to me than saving electricity. (42) | -.13 | -.09 | .36 | .39 | .21 | .07 |
| I would not raise my air conditioning thermostat above the setting I find comfortable. (33) | .00 | .19 | .10 | .34 | .26 | -.13 |
| V. Reality of Energy Shortage | | | | | | |
| There is no real shortage of energy. (40) | -.06 | -.03 | .05 | .05 | .71 | -.04 |
| We are facing long-term energy problems. (27) | .01 | .22 | -.15 | -.14 | -.69 | -.27 |
| Supply and price manipulations by oil and electric companies are largely responsible for the present energy problems. (39) | .23 | -.08 | -.06 | .23 | .35 | .06 |
| VI. Coercion | | | | | | |
| Government regulations are largely responsible for the energy problem. (47) | -.03 | -.17 | .06 | .11 | .17 | .50 |
| I would be willing to reduce my energy consumption if it cost me something not to. (37) | .04 | .36 | -.28 | -.07 | -.20 | .49 |
| People have the right to use as much electricity as they want. (44) | -.18 | -.14 | .31 | .12 | .23 | .33 |
| Items With Factor Loadings < .30 | | | | | | |
| The amount of energy a residential consumer could save isn't worth the effort required to save it. (28) | -.21 | -.29 | .12 | .13 | .23 | .01 |
| I would be willing to pay for any excess energy I use if I were credited for the energy that I conserve on other occasions. (35) | .03 | .09 | .14 | -.23 | -.23 | .23 |
| I think I am well informed about household energy conservation. (43) | .29 | .17 | -.12 | .16 | -.01 | .12 |

Notes.

1. Numbers in parentheses are questionnaire item numbers.
2. Based on responses of 139 subjects.

Table 2

Responses to Energy-related Attitude Items (N = 161)

| | Factor/Component Items[a] | Disagree[b] (%) | Neither Agree nor Disagree (%) | Agree[c] (%) | Mean[d] Score | SD |
|---|---|---|---|---|---|---|
| I. | Conservation Image | | | | | |
| | I consider myself to be an energy conserver. (36) | 0.6 | 9.1 | 90.3 | 1.69 | .66 |
| | I would conserve energy regardless of whether I had to pay for it or not. (41) | 1.3 | 9.8 | 88.9 | 1.64 | .71 |
| | In my family we generally try to conserve energy. (31) | 0.6 | 5.0 | 94.3 | 1.54 | .62 |
| II. | Personal Impact | | | | | |
| | Energy conservation in the home could ease present energy problems. (32) | 22.8 | 11.1 | 66.0 | 2.40 | 1.23 |
| | Wasteful consumption in the home has greatly contributed to this country's energy problems. (29) | 37.4 | 11.0 | 51.6 | 2.81 | 1.42 |
| | There will continue to be enough energy for our homes if everyone quits wasting it. (38) | 11.5 | 11.5 | 77.0 | 2.00 | 1.02 |
| | If people were better informed about the energy situation they would conserve more. (25) | 18.5 | 15.3 | 66.2 | 2.36 | 1.16 |
| | I would be willing to reduce my energy consumption if it cost me something not to. (37) | 14.0 | 20.9 | 65.1 | 2.31 | 1.19 |
| | I would rather reduce my energy consumption than have to pay for it. (30) | 11.8 | 10.5 | 77.8 | 1.91 | 1.20 |
| III. | Willingness to Pay | | | | | |
| | I would rather pay for part of my utilities than reduce my energy consumption. (26) | 78.5 | 10.7 | 10.8 | 4.27 | 1.11 |
| | I would rather reduce my energy consumption than have to pay for it. (30) | 11.8 | 10.5 | 77.8 | 1.91 | 1.20 |
| | It is too much effort to shut off the air conditioning and open the windows every time it gets a little cooler outside. (46) | 77.6 | 14.3 | 8.1 | 4.20 | 1.05 |
| | My own personal comfort is worth more to me than saving electricity. (42) | 56.8 | 27.0 | 16.2 | 3.61 | 1.05 |
| | People have the right to use as much electricity as they want. (44) | 75.3 | 15.1 | 9.6 | 4.10 | 1.07 |

[a] Numbers in parentheses are questionnaire item numbers.

[b] Disagree includes responses of strongly and somewhat disagree.

[c] Agree includes responses of strongly and somewhat agree.

[d] Mean scores are based on responses made on a 5-point scale, where 1 = strongly agree and 5 = strongly disagree.

Table 2 (Continued)

| | Factor/Component Items[a] | Disagree[b] (%) | Neither Agree nor Disagree (%) | Agree[c] (%) | Mean[d] Score | SD |
|---|---|---|---|---|---|---|
| IV. | Importance of Air Conditioning | | | | | |
| | It is essential to my family's health and well-being for the house to be air conditioned in the summer. (45) | 12.8 | 12.2 | 75.0 | 1.98 | 1.20 |
| | I find I can't relax or work well unless the house is air conditioned in the summer. (34) | 14.1 | 6.4 | 79.4 | 1.85 | 1.17 |
| | My own personal comfort is worth more to me than saving electricity. (42) | 56.8 | 27.0 | 16.2 | 3.61 | 1.05 |
| | I would not raise my air conditioning thermostat above the setting I find comfortable. (33) | 30.5 | 12.3 | 57.1 | 2.43 | 1.45 |
| V. | Reality of Energy Shortage | | | | | |
| | There is no real shortage of energy. (40) | 48.0 | 20.9 | 31.1 | 3.30 | 1.32 |
| | We are facing long-term energy problems. (27) | 9.9 | 11.9 | 78.1 | 1.89 | 1.10 |
| | Supply and price manipulations by oil and electric companies are largely responsible for the present energy problems. (39) | 11.6 | 9.5 | 78.9 | 1.91 | 1.14 |
| VI. | Coercion | | | | | |
| | Government regulations are largely responsible for the energy problem. (47) | 36.1 | 28.7 | 35.2 | 3.07 | 1.31 |
| | I would be willing to reduce my energy consumption if it cost me something not to. (37) | 14.0 | 20.9 | 65.1 | 2.31 | 1.19 |
| | People have the right to use as much electricity as they want. (44) | 75.3 | 15.1 | 9.6 | 4.10 | 1.07 |
| | Items With Factor Loadings < .30 | | | | | |
| | The amount of energy a residential consumer could save isn't worth the effort required to save it. (28) | 76.7 | 12.0 | 11.3 | 4.17 | 1.13 |
| | I would be willing to pay for any excess energy I use if I were credited for the energy that I conserve on other occasions. (35) | 27.0 | 20.6 | 52.5 | 2.65 | 1.47 |
| | I think I am well informed about household energy conservation. (43) | 14.7 | 11.5 | 77.7 | 2.16 | 1.02 |

[a] Numbers in parentheses are questionnaire item numbers.

[b] Disagree includes responses of strongly and somewhat disagree.

[c] Agree includes responses of strongly and somewhat agree.

[d] Mean scores are based on responses made on a 5-point scale, where 1 = strongly agree and 5 = strongly disagree.

Three broad areas of impact of the treatment program were identified as results of the interviews: (1) The effects of various treatment components on family members' awareness, beliefs, information level, motivation, and behaviors, (2) sensitization to external factors affecting the success of treatment families' conservation efforts, and (3) contamination of the control group. Possible treatment extensions were also discussed.

Treatment Effects

One of the most important treatment components, from the perspective of interviewed residents, was the energy conservation coordinator. The coordinator was seen as reaching out to passive individuals, gaining the cooperation of many families who otherwise would not have become involved in such a program. The coordinator's influence was seen as occurring through "personal contact" and by giving "face-to-face answers" to people's questions. Interviewees perceived that the coordinator's role was to "clarify" and provide "two-way communication," as well as to serve as "a constant reminder" to conserve. Reportedly, the coordinator's behavior was effective in achieving greater receptivity to the newsletter, maintaining participants' interest, and keeping them aware of program activities. Researchers' concerns regarding the inconvenience caused by the coordinator's unannounced door knocking were dispelled by assurances that the coordinator was flexible in being willing to return at a more convenient time. The coordinator's visits were seen by the interviewees as "essential," "very important," "critical" to the success of the program, and as the "only way to gain the cooperation of every household." The visits were seen as more effective in arousing attention and maintaining interest than the newsletter or information alone.

The variety of informational components and prompts were, in general, positively received. Although many interviewees claimed to enjoy the newsletter, the readership varied. In some cases, no one in the family had read the newsletter; in others, it had been read by everyone in the family. In about half the cases, both husband and wife claimed to have read it. Among those who did read the newsletter, it was read with varying regularity. The conservation tips, a major feature of the newsletter, were "liked," "enjoyed," and found "useful" by many interviewees, although some interviewees claimed they already knew most or all of the suggestions.

The other major feature of the newsletter, the group consumption feedback, was often ignored or misunderstood. Some interviewees ignored the graphs, but read the interpretive text; some misunderstood the makeup of the "nonparticipant" group with which they were being compared. Those who read the consumption feedback found it encouraging and uplifting to learn of their success as well as useful in keeping up their interest in the program.

Information and prompts in various other forms were usually well received. Although the comic book was "enjoyed" and "helpful," young children did not understand terms such as "conserve energy" and older children sometimes perceived the comic as juvenile. When children and parents discussed the materials, there were mutually beneficial effects, with parents becoming more alert to their conservation behavior and the children gaining enhanced understanding of the abstract concepts and terms.

Another form of information and prompt was the cookbook, "Energy-Conscious Cooking," which was distributed to the treatment group. Some residents claimed the cookbook gave them "greater consciousness" of energy conservation and that it was "thought provoking."

Children who expressed an interest were given an energy detective kit consisting of a 3-inch detective button, a poster depicting energy "thieves" and "monsters" (high consumption appliances or practices), and a detective case log with ten conservation-oriented practices (e.g., "Doors closed quickly when the air conditioner is on"). Children reportedly "loved" the posters, and, although explanations by parents were often required, they apparently were made more aware of appropriate practices and the poster served as a reminder to conserve. As energy detectives, the children monitored family energy conservation practices daily for 1 week and recorded their observations on their detective case log sheet. Again, younger children required parental assistance in understanding the concepts and procedures for using the log sheet. The energy detective program was very effective in obtaining complete family involvement, both through parental coaching and in children's monitoring and reminders. Children who completed the energy detective case log received conservation slogan stickers modeled after bumper stickers (e.g., "Make every kilowatt count").

Interviewees were also questioned regarding several treatment components in which residents failed to participate. These included a poster contest, speakers for adults and children, and a power plant tour. Factors that were cited as interfering with participation included conflicts with other activities scheduled at the same time, age restrictions (only children 12 or older were allowed on the power plant tour), the need for child care during parental attendance, inadequate notice of events and deadlines, travel difficulties, costs of materials (for poster contest), and the intrinsic interest of the topic or activity. These factors should be considered in planning and conducting future programs.

Sensitization

Interviews revealed that participation in the energy conservation program caused residents to become sensitized to their own energy-related behaviors and habits. Similarly, there was an increased awareness regarding the structural constraints on conservation and the influence of facility maintenance on energy consumption. Interviewees were particularly concerned with the lack of cross ventilation, which precluded its substitution for air conditioning during temperate periods. These two quotations exemplify the views of many interviewees: "(We) need screens to reduce the necessity of air conditioning," and "The housing is not built to save--not only here, but elsewhere, too."

Interviewees felt that their attempts at energy conservation should be supported by maintenance performed by the housing office. They felt that a lack of responsiveness in maintenance indicated a lack of concern within the command regarding the priority of conservation. Inconsistency in command concern for conservation was also inferred from observations of lack of conservation in work settings around the base.

Contamination

Some treatment contamination of the control group was found. One interviewee claimed to have regularly transmitted treatment materials and conservation information to a friend who was not receiving them. There were other indications that conservation information was occasionally exchanged informally in conversation with control group residents. Similarly, some children took conservation program materials (e.g., posters) to their school to be used in class discussions.

Extensions

Interviewees were questioned regarding their suggestions for improving and strengthening the education program. Often their suggestions took the form of goals such

as trying to reach children of specific age groups. Concrete actions concerned approaching each family member through organizations--the children through scout clubs or school, wives through the wives' club, and service members through their commands. Suggestions of nonspecific approaches included tenant organizations or a "monthly participants' meeting."

Residents considered it important that the command emphasize conservation in the work settings, and that the housing office provide a model of concern for conservation. Assuming the availability of individual family energy consumption data, one interviewee suggested that usage be monitored, with warnings issued, followed by eviction for overuse. Another suggested naming a "Conserver-of-the-Month," and providing his or her family with a dinner out as an award. Other suggestions were to use a visual goal (e.g., a billboard thermometer) to bolster feedback and comparisons and to use notices for visible consumption abuses.

Interviewees made occasional suggestions of rationales that should be used, such as the linkage between petroleum consumption and inflation. Many suggestions were received for structural changes, maintenance support, and adoption of new (e.g., solar) technology.

## DISCUSSION

### Program Effectiveness

This program resulted in a significant reduction in electricity consumption, thus demonstrating the potential effectiveness of such an approach. The program's primary treatment components consisted of (1) educational materials, (2) conservation activities, (3) feedback on group consumption, and (4) household visits by a program coordinator. Due to the nature of the design, these individual treatment components are not directly accessible to evaluation. Still, within the inherent limitations, estimates of the effects of the program components can be made from both the findings of previous research and from interviews with participant residents.

The use of educational materials generally received favorable comments from interviewed residents, while previous studies (e.g., Hayes & Cone, 1977) had found the use of such materials alone to be virtually ineffective in reducing energy consumption. Of the several energy conservation activities planned as means of introducing conservation related information, only the "energy detective" program designed to reach elementary-school-aged children received substantial support. Consumption feedback was seen as an effective means of maintaining participant interest, as the interviewees felt that knowledge of their improvements was very rewarding. Previous research has shown that consumption feedback is effective in reducing utility consumption, particularly when combined with incentives for conserving (e.g., Seligman & Darley, 1977).

The final treatment component consisted of household visits by the program coordinator. According to interviewed residents, the coordinator enlisted their cooperation and served as a recurring reminder to conserve. Also, knowing that the coordinator might arrive at any time made the residents more likely to conserve. The coordinator provided residents with a constant flow of materials, and also served as a resource person to answer questions regarding conservation and to clarify practices recommended. The coordinator also supported proconservation actions of residents by verbal commendations.

### Attitudinal Influences

With regard to energy-related attitudes, residents typically saw themselves and their families as conservers and generally held proconservation attitudes. Although previous research has found a relationship between energy-related attitudes and energy consumption (Seligman et al., 1979), the attitude areas measured in the present study were not found to be significantly related to consumption. One possible reason for this is the manner in which the attitudes were measured. In this study, the questionnaire could be completed by any member of the household, while in the Seligman et al. study the husband and wife each completed a copy of the survey. A low degree of attitude consistency among members of the household may have greatly decreased the potential predictive value of the energy attitudes measured in the present study.

### Implementation Considerations and Extensions

The potential effectiveness of the present program was demonstrated for the cooling season. To extend the program for the heating season should be a straightforward process that would require identifying the initiation of the heating season, gathering materials regarding conservation in space heating, and planning the systematic use of these materials just as in the cooling season program. Proposed short-term, high intensity interventions at the beginning of high utility consumption periods could be repeated annually. Evidence from the follow-up period suggests that behavior changes would endure for the remainder of each season. Such a program would reduce energy consumption, while minimizing treatment satiation and program costs.

Interviewees were quick to mention any lack of support from the housing office. The need for consistent energy conservation throughout the entire command was evident, as residents reported a sensitivity to nonconserving practices elsewhere in Navy activities. This demonstrates the necessity to integrate the residential conservation program into a comprehensive command program.

## CONCLUSIONS

An effective behaviorally oriented energy conservation program for master-metered military family housing appears to be a potentially viable alternative to other approaches. With program extension and refinement, even greater energy savings than those demonstrated here should be attainable with less required effort. Energy savings under master metering should be achievable with less delay and cost, as well as with fewer negative side effects than individual metering and utility billing.

The effectiveness of this conservation program is probably based on the motivating influence of the coordinator, supported by the positive feedback inherent in decreased consumption levels, in inducing behavioral changes in response to conservation tips and information.

Residents' energy-related attitudes, as measured in the present study, appear to be unrelated to electricity consumption. Although this finding suggests that an energy conservation program should place relatively minor emphasis on attitudes, such interpretations are probably premature.

## RECOMMENDATIONS

1. The conservation program should be further developed and extended to cover the entire annual cycle.

2. An energy conservation manual should be prepared to assist in the implementation and operation of the conservation program.

3. A fully developed program should be implemented under differing climatic conditions to evaluate its cost effectiveness.

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# APPENDIX A

# CORRY STATION RESIDENTIAL ENERGY CONSERVATION QUESTIONNAIRE

HOUSING DEPARTMENT
NAVY PUBLIC WORKS CENTER
NAVAL AIR STATION
PENSACOLA, FLORIDA 32508

Dear Family Housing Resident;

In response to the nation's energy problems and as part of an ongoing program in energy research, the Naval Personnel Research and Development Center, San Diego, is examining residential energy consumption and conservation at various Navy sites throughout the country. Corry Family Housing has been selected as one of the sites to participate in the program. In connection with this program, we ask that you take ten or fifteen minutes to complete the following survey concerning family composition, attitudes, and the appliances your family owns.

Mrs. Janice McNair, the Energy Conservation Coordinator for Corry Housing, will soon be contacting your family to collect this survey, and provide your family with assistance in your energy conservation efforts.

Your assistance is greatly appreciated.

Sincerely,

J. J. Pastucha
Housing Director

CORRY STATION RESIDENTIAL ENERGY CONSERVATION SURVEY

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Protection of Individual Privacy

Under the authority of 5USC301, as reflected in OPNAV 5450 of 17 April 1975, information is requested regarding your personal opinions and attitudes. The information will be used by the Navy Personnel Research and Development Center, San Diego, for statistical purposes only. In no case will your response be used in making decisions affecting you personally. Your participation is voluntary; there will be no penalty for deciding not to complete the survey.

---

INSTRUCTIONS

1. This questionnaire consists of multiple-choice questions. Please respond to these questions by circling the number of your choice on the questionnaire.

2. Please be sure to include your name and address in the spaces provided.

3. Use any pencil or pen, the darker the better.

4. Erase cleanly or put an "X" over any answer you wish to change.

PLEASE COMPLETE THIS QUESTIONNAIRE AS SOON AS POSSIBLE

NAME OF SERVICE MEMBER: _____

NAME OF PERSON FILLING OUT SURVEY: _____

ADDRESS: _____ (1-5)

## YOU AND YOUR FAMILY

Some of these questions refer to your family's service member. If there is more than one service member in your family please answer the questions about the one under whose name your housing is assigned.

1. The person filling out this questionnaire is: (6)

   1. The family's service member
   2. The service member's spouse
   3. A child member of the family
   4. Other: _____

2. What is the service member's sex? (7)

   1. Male
   2. Female

3. What is the highest educational level of the service member? (8)

   1. Eighth grade or less
   2. Some high school
   3. High school graduate or equivalent
   4. Some college
   5. College graduate (Bachelor's degree)
   6. Some graduate work or advanced degree

4. What is the age of the service member? (9)

   1. 18-25 years
   2. 26-30 years
   3. 31-40 years
   4. 41-50 years
   5. Over 50 years

5. What is the pay grade of the service member? (10)

   1. E1, E2 or E3
   2. E4
   3. E5
   4. E6
   5. E7
   6. E8
   7. E9
   8. Warrant Officer
   9. Other

6. How long have you lived in your present residence? (11)

   1. 0-3 months
   2. 4-6 months
   3. 7-9 months
   4. 10-12 months
   5. 13-15 months
   6. 16-18 months
   7. 19-21 months
   8. 22-24 months
   9. Over 24 months

7. How many people live in your home (include yourself and all those you expect to live with you at least 6 months)? (12)

1. 1 only
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9 or more

8. Has there been any change in the number of persons living in your household during the last 12 months? (13)

1. No
2. Yes (please explain: e.g., husband on deployment for 6 months; mother-in-law visiting for 2 months; baby born in April) _____

_____

9. List the ages of your children from youngest to oldest. (14)

1. _____
2. _____
3. _____
4. _____
5. _____

10. How many days during an average week does a member of your family stay at home for most of the day? (15)

0. 0
1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7

11. Which of the following statements best describes your overall satisfaction with the Navy? (16)

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied
6. No opinion

12. Which of the following statements best describes your overall satisfaction with your present Navy housing? (17)

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied
6. No opinion

13. Do you plan to take a vacation in the next few months? (18)

1. No
2. Yes, for one week or less
3. Yes, for more than one week

14a. Are you expecting any visitors during the next few months? (19)

1. No
2. Yes, for one week or less
3. Yes, for more than one week

b. How many? _____

15. When do you expect your next PCS move to be? (20)

1. In less than three months
2. In three to six months
3. In more than six months
4. Don't know

## APPLIANCE INVENTORY

Please provide the following information about the appliances in your residence.

16. What type of television do you currently use? (21)

1. Do not own a television
2. One black and white only
3. One color only
4. Color only, but more than one
5. Black and White only, but more than one
6. One or more of each type (color and B&W)

17. Do you use a microwave oven in your home? (22)

1. No
2. Yes, without a browning element
3. Yes, with a browning element

18. How many refrigerators do you use in your home? (23)

1. 1
2. 2 or more

19. In addition to your refrigerator, do you use a separate food freezer? (24)

1. No
2. Yes, an upright type
3. Yes, a chest type

20. Do you use a dishwasher? (25)

1. No
2. Yes

21. Do you use a washing machine in your residence? (26)

1. No
2. Yes

22. Do you use a clothes dryer in your residence? (27)

1. No
2. Yes, electric
3. Yes, gas

23. Do you use portable electric fans in your residence? (28)

1. No
2. Yes (one only)
3. Yes (two only)
4. Yes (three or more)

24. Do you use a heated water bed? (29)

1. No
2. Yes

## ENERGY ATTITUDES

Many of the following items appear similar, but they are slightly different in each case. Using the following scale, please choose the alternative which best describes how you feel about the statement.

1. Strongly agree
2. Somewhat agree
3. Neither agree nor disagree
4. Somewhat disagree
5. Strongly disagree
6. No opinion

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 25. | If people were better informed about the energy situation they would conserve more. | (30) |
| 1 | 2 | 3 | 4 | 5 | 6 | 26. | I would rather pay for part of my utilities than reduce my energy consumption. | (31) |
| 1 | 2 | 3 | 4 | 5 | 6 | 27. | We are facing long-term energy problems. | (32) |
| 1 | 2 | 3 | 4 | 5 | 6 | 28. | The amount of energy a residential consumer could save isn't worth the effort required to save it. | (33) |
| 1 | 2 | 3 | 4 | 5 | 6 | 29. | Wasteful consumption in the home has greatly contributed to this country's energy problems. | (34) |

1. Strongly agree
2. Somewhat agree
3. Neither agree nor disagree
4. Somewhat disagree
5. Strongly disagree
6. No opinion

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 30. | I would rather reduce my energy consumption than have to pay for it. | (35) |
| 1 | 2 | 3 | 4 | 5 | 6 | 31. | In my family we generally try to conserve energy. | (36) |
| 1 | 2 | 3 | 4 | 5 | 6 | 32. | Energy conservation in the home could ease present energy problems. | (37) |
| 1 | 2 | 3 | 4 | 5 | 6 | 33. | I would not raise my air conditioning thermostat above the setting I find comfortable. | (38) |
| 1 | 2 | 3 | 4 | 5 | 6 | 34. | I find I can't relax or work well unless the house is air conditioned in the summer. | (39) |
| 1 | 2 | 3 | 4 | 5 | 6 | 35. | I would be willing to pay for any excess energy I use if I were credited for the energy that I conserve on other occasions. | (40) |
| 1 | 2 | 3 | 4 | 5 | 6 | 36. | I consider myself to be an energy conserver. | (41) |
| 1 | 2 | 3 | 4 | 5 | 6 | 37. | I would be willing to reduce my energy consumption if it cost me something not to. | (42) |
| 1 | 2 | 3 | 4 | 5 | 6 | 38. | There will continue to be enough energy for our homes if everyone quits wasting it. | (43) |
| 1 | 2 | 3 | 4 | 5 | 6 | 39. | Supply and price manipulations by oil and electric companies are largely responsible for the present energy problems. | (44) |
| 1 | 2 | 3 | 4 | 5 | 6 | 40. | There is no real shortage of energy. | (45) |
| 1 | 2 | 3 | 4 | 5 | 6 | 41. | I would conserve energy regardless of whether I had to pay for it or not. | (46) |
| 1 | 2 | 3 | 4 | 5 | 6 | 42. | My own personal comfort is worth more to me than saving electricity. | (47) |
| 1 | 2 | 3 | 4 | 5 | 6 | 43. | I think I am well informed about household energy conservation. | (48) |
| 1 | 2 | 3 | 4 | 5 | 6 | 44. | People have the right to use as much electricity as they want. | (49) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 45. | It is essential to my family's health and well-being for the house to be air conditioned in the summer. | (50) |
| 1 | 2 | 3 | 4 | 5 | 6 | 46. | It is too much effort to shut off the air conditioning and open the windows every time it gets a little cooler outside. | (51) |
| 1 | 2 | 3 | 4 | 5 | 6 | 47. | Government regulations are largely responsible for the energy problem. | (52) |

THANK YOU. PLEASE HAVE THIS QUESTIONNAIRE HANDY WHEN JANICE MCNAIR STOPS BY.

## APPENDIX B

## SAMPLE MATERIALS

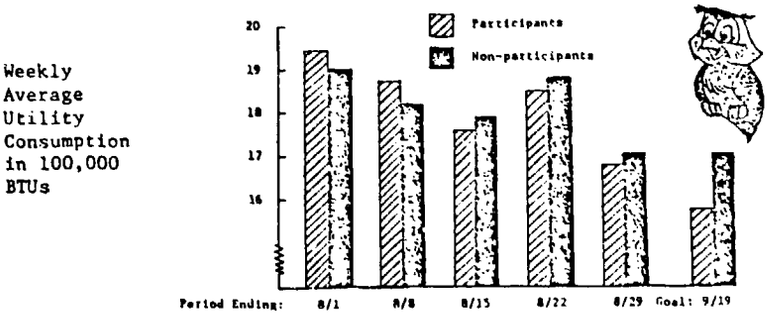
# THE CORRY KIL-A-WATT

September 4, 1979
Volume No. 3

## ENERGY CONSERVATION RESULTS

The results of the second two-week period of the energy conservation study at Corry Housing indicate we're making progress, although it's slightly slower than we had anticipated. Corry energy conservation participants had the lowest utility consumption so far, a very encouraging finding. Because of milder weather conditions, non-participants also reduced their consumption, a factor which did not permit us to achieve our goal of a 10% energy savings. Although we have not yet reached our goal, the results do seem to show that some people are finding the energy conservation tips helpful, and that people in their families are pulling together to "use energy wisely." The chart below shows the weekly average utility consumption for participants and non-participants.

UTILITY CONSUMPTION OF PARTICIPANTS COMPARED TO NON-PARTICIPANTS




I want to commend everyone for their efforts; I expect that conscientious application of the energy conservation tips by every family will lead to our achieving the goal of a 10% savings. Please note the additional kitchen tips on the back. Keep the air conditioning tips in mind, because they have the greatest impact on utility consumption: Thermostat settings--78° or higher; minimize heat generated inside--close drapes, cook and wash dishes during cooler hours of the day; maximize efficiency--change fileter and use exhaust fans when appropriate. Let's shoot for the 10% savings and watch our watts!

## CORRY SPECIAL EVENTS

ENERGY CONSERVATION POSTER CONTEST. It's time to let the young people direct some of their own energy toward a little creative expression! Get out the paper, scissors, glue, marking pens, and anything else that seems appropriate, because we're having a poster contest. The theme of the contest is "Energy Conservation in the Home." The rules are simple:

1. Anyone 18 years of age and younger is eligible to participate.
2. Posters must be at least 8 x 10 inches.
3. Artist's name, age, and quarters number must be printed on the lower right corner (front).
4. Posters must be turned in to the NAS Pensacola Housing Office or to Janice McNair by 4p.m. on September 10th.
5. A maximum of 3 entries per person is allowed.

Posters will be judged on originality, appropriateness and style. Ribbons will be given for 1st through 5th places and honorable mention in each age division. There will be an exhibition of all posters and an awards cermony Time, dates, and location of the exhibition and awards ceremony will be forthcoming. Let's see how we can use our energy to save energy.

KITCHEN AND LAUNDRY TIPS

If you want to save energy in the kitchen, the place to start is with the appliances you use the most and which require the most power. These are the refrigerator/freezer, dishwasher, washer and dryer, and oven/range. We've looked at two of the big appliances already, the refrigerator/freezer and the dishwasher. This week our main focus will be the remaining big consumers, the washer and dryer and oven/range. Can openers, electric knives, blenders and other small appliances account for only a fraction of one percent of all the electricity used in the home. So, whether or not you consider them to be frills, enjoy the small appliances and place your conservation efforts toward the big energy consumers.

WASHER/DRYER

1. FILL WASHER AND DRYER COMPLETELY--Fill your washer and dryer completely, but don't overload them. If they have small-load attachments or special low water levels, use these for smaller loads. It takes nearly as much energy to wash and dry a small load as it does a full load.

2. SELECT CORRECT WASH TIME--Select a wash time to match load and soil levels. Regular clothes need only a 10-15 minute washing cycle.

3. SELECT CORRECT WASH WATER TEMPERATURE--Use warm or cold water whenever possible. Cold or warm water can be used to wash permanent press articles, washable woolens, and lightly soiled articles. In addition to energy savings, cold water is more effective than hot water in removing lint collected on garments. Use a cold water rinse.

4. USE CORRECT AMOUNT OF DETERGENT--Follow the instructions on the detergent box. Oversudsing makes your machine work harder and uses more energy.

5. KEEP FILTERS CLEAN--Clean the lint filter on your dryer after each use. Lint impedes air flow in the dryer, lengthens drying time and uses more energy.

6. DRY CLOTHES IN CONSECUTIVE LOADS--Occasional drying uses more energy to warm the dryer up to the desired temperature each time you begin.

7. USE "FLUFF" OR "AIR ONLY" SETTING--If your dryer has one, "fluff" and "air only" settings can be used for permanent press fabrics, saving your clothing and watts.

8. USE WASHER AND DRYER IN THE EARLY MORNING OR LATE EVENING HOURS--The heat generated by your laundry equipment will add to the already warm temperature of your summer home.

OVEN/RANGE

1. PLAN COMPLETE OVEN MEALS--A complete meal can be cooked for little more energy than an individual item.

2. DON'T PEEK--Opening an oven door unnecessarily can result in the loss of as much as 20% of the heat.

3. COVER POTS AND PANS--Covered pots and pans retain the heat better, allowing for lower cooking temperatures and faster cooking times. Also, use a pot or pan that is the same size or larger than the burner. A pot too small for the unit will allow extra heat to escape into the kitchen, a situation especially undesirable during the warm summer months.

4. USE THE OVEN--For foods requiring long cooking periods, such as stews, use your oven instead of the range top. Surface units stay on the whole time they are in use; the oven is on for only part of each hour it's used. The rest of the time it "coasts" because its insulation holds heat in. Another advantage is that less heat is dissipated into the air when the oven is used instead of the range top, reducing heat buildup in a warm summer home.

5. USE A MODERATE FLAME--When cooking with the rangetop burner, use moderate flame settings to conserve gas.

6. USE A MICROWAVE OVEN AND PORTABLE COOKING EQUIPMENT--For small or specialized jobs, microwave ovens and portable cooking equipment, such as broilers, skillets, coffee pots, and toasters, generally use less energy than your oven or range top would for the same time.

7. USE THE EXHAUST FAN--The exhaust fan can remove hot moist air from the kitchen, allowing your air conditioner to efficiently maintain a comfortable household temperature.

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## FAMILY CONTACT FORMAT--CORRY HOUSING, 3RD PERIOD

I. Review of previous periods:

- A. Savings relative to 10 percent goal.
- B. Refresh their memory of air conditioning and kitchen/laundry tips.
- C. Inquire re: problems encountered by interviewee in applying tips and getting children's cooperation.
- D. Check on completion of energy detective; give out stickers and instructions.

II. Administer 3rd period treatment:

- A. Handout kitchen/laundry checklist and review each item.
- B. Discuss children's poster contest:
  1. Refer to rules in KIL-A-WATT (especially name, age, and deadline).
  2. Mention age classes, ribbons awarded, public exhibition, and award ceremony.
  3. Handout Walt Disney comic on energy conservation for children "to use to get ideas for their posters."
- C. State 3rd period conservation goal for Corry: "Save 10 percent."
- D. Elicit resident commitment:
  1. "Would you be willing to try to use the kitchen and laundry tips and try to get the kids involved in conserving energy and saving 10 percent of the utilities?"
  2. State your own enthusiasm about the cumulative effect of everyone's efforts and their conscientious contribution.

III. Future events and activities:

- A. Tips for various other household areas.
- B. Conservation results to be announced in the KIL-A-WATT.

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